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NOTES:
Inventor: Kazunari Motohashi
Serial No.: 10/ 613,371
Art Unit: 1773
Filed: July 3, 2003
Attorney Ref.: 075834.00409

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Application Number	10/613,371
Filing Date	July 3, 2003
First Named Inventor	Kazunari Motohashi
Art Unit	1773
Examiner Name	Kevin M. Bernatz
Attorney Docket Number	075834.C0409

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Appeal Brief Accompanying Notice of Appeal and Notice of Appeal (PTO/SB/31)

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☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 1,000.00

Complete if Known	
Application Number	10/ 613,371
Filing Date	July 3, 2003
First Named Inventor	Kazunari Motohashi
Examiner Name	Kevin M. Bernatz
Art Unit	1773
Attorney Docket No.	075834.00409

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1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
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1005	160	2005	80	Provisional filing fee	

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Total Claims	-20** =		X		
Independent Claims	- 3** =		X		
Multiple Dependent					

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	88	2201	44	Independent claims in excess of 3
1203	300	2203	150	Multiple dependent claim, if not paid
1204	88	2204	44	** Reissue independent claims over original patent
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1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	$500.00
1402	340	2402	170	Filing a brief in support of an appeal	$500.00
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
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1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR 1.129(b))	
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SUBMITTED BY				(Complete *if applicable*)	
Name (Print/Type)	Robert J. Depke	*Registration No. (Attorney/Agent)*	37,607	*Telephone*	312-277-2600
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	10/613,371	**Confirmation No.:**	4837
Applicant:	Kazunari Motohashi		
Filed:	July 3, 2003		
TC/A.U.:	1773		
Examiner:	Kevin M. Bernatz		
Docket No.:	075834.00409		
Customer No.:	33448		

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest is Sony Corporation as a result of transfer of all right, title and interest to the subject matter of this Application Serial No. 10/613,371, via the Assignment recorded in the Patent Office in Reel 014269 Frame 0058 on July 3, 2003.

II. RELATED APPEALS AND INTERFERENCES

Applicant and the undersigned are unaware of any further related judicial proceedings, appeals, or interferences in relation to the instant Appeal.

III. STATUS OF CLAIMS

The claims currently stand in condition as modified by an Amendment A dated November 16, 2004 amending claim 1, as further modified by Amendment Accompanying RCE dated June 24, 2005 amending claim 1, and finally modified by an Amendment Accompanying B dated March 19, 2006 amending claim 1 and adding new claims 2 and 3.

Accordingly, claims 1 - 3 are currently rejected and appealed, and stand in condition as set forth in the attached Appendix of Claims on Appeal.

IV. STATUS OF AMENDMENTS

No Amendment After Final affecting the claims has been filed or entered by the Examiner. Accordingly, all remaining claims stand in the same condition as they did at the time of the May 26, 2006 Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a high-density magnetic recording medium for use in a system using a magnetoresistive effect magnetic head (MR head) or a giant magnetoresistive effect magnetic head (GMR head). The magnetic recording medium of the present invention is extremely advantageous in effectively utilizing high reproduction sensitivity for MR or GMR heads. The present invention is directed to a particular type of magnetic thin films in which a metallic material is deposited through vacuum thin film forming techniques over a non-magnetic substrate material. Such magnetic thin-film tapes have excelled in coercive force and in squareness ratio. (See pages 1 – 2 of the Background of the Invention).

Traditionally, thin-film deposition is accomplished by making an elongated nonmagnetic support run in the longitudinal direction and depositing a magnetic material on a major surface of the nonmagnetic support while the tape runs, thereby forming a magnetic layer. However, when the thickness of the magnetic tape produced by using the oblique evaporation method is reduced from 200nm to under 55nm, the number of magnetic fine

particles contained in the direction of film thickness becomes very small. As a result, the orientation of the deposited magnetic fine particles begins to seriously affect the magnetic properties of the entire magnetic layer. (See page 4: Summary of the Invention).

As described on pg. 6 of the disclosure and in Fig's 1A, 1B, 2A, and 2B, Applicants have identified a critical range of operation (under 55nm) in which the arranging directions of the dispersed metallic particles no longer follow a continuous distribution (See Fig's 1A and 1B), but rather form several distinct discrete orientations (See Fig's 2A and 2B). Accordingly, Applicants invention is directed to a method of providing an optimal growth orientation of magnetic particles in thin-film magnetic recording mediums for use with magnetoresistive effect and giant magnetoresistive effect heads to reproduce a signal. (See the bottom of page 7 of the disclosure). As a result, electromagnetic conversion properties are enhanced (See page 8 of the disclosure).

In accordance with the foregoing, independent claim 1 is directed to a thin magnetic recording medium having a magnetic recording layer 3 that is 50 nm or less and wherein an angle θ (See Fig. 5) which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation: $\theta i - \theta f \leq 25°$ (See Fig. 5 and pg. 15 of the specification), where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship: $\alpha i - \alpha f \leq 25°$ (See pg. 15 of the specification).

Also in accordance with the foregoing, dependent claim 2 is directed to a magnetic recording medium according to claim 1, further including an underlying layer 2 comprised of

binder residents and having an average particle diameter of 5 to 30 nm and wherein he density of surface projections is in a range of from 50 X 10^4 per millimeter squared to 3000 X 10^4 per millimeter squared (See pg.'s 10 – 11 of the specification).

Finally, dependent claim 3 is directed to a magnetic recording medium according to claim 1, further wherein the magnetic layer 3 is less than the 50 nm in thickness (See Examples 2 and 3 in Tables 1 and 2, pg.'s 26 and 27 of the specification).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether the teachings of the *Ishida et al.* (U.S. Patent No. 5,554,440) reference provide the requisite disclosure in order to render anticipated obvious claims 1 and 3 under 35 U.S.C. §102(b).

B. Whether the teachings of the *Ishida et al.* (U.S. Patent No. 5,554,440), and *Tsunekawa et al.* (U.S. Patent No. 7,026,064) references provide the requisite disclosure in order to render obvious claim 2 under 35 U.S.C. §103(a).

VII. ARGUMENT

Applicant respectfully submits that the prior art references of record, whether considered alone, or in combination, fail to teach or suggest Applicant's presently claimed invention. As detailed below, the rejections set forth by the Examiner are improper.

A. The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 1.

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 1 under 35 U.S.C. §102(b). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Claim 1 currently contains the following limitations, numerically numbered for ease of reference:

1) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,

2) wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$$\theta i - \theta f \leq 25°$$

where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and

3) and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship:

$$\alpha i - \alpha f \leq 25°.$$

Applicant notes that the main contentions remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element (1) regarding the

thickness of the magnetic layer and the claim element (2) regarding the growth orientation of the deposited magnetic particles.

In regard to the first claim limitation, *Ishida* fails to anticipate Applicants claimed magnetic layer at a thickness of 50nm or less. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the *Ishida* reference, which states that the magnetic layer should preferably be grown at a thickness of "from 50nm to 150 nm." From this statement alone, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that "When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger...But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer." In light of the use of the term "exceed," and in light of Fig. 21 which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below, Applicants submit that one of ordinary skill in the art would interpret the stated range of operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

In contrast to the above references, Applicant has identified the criticality of the range of magnetic particle growth angles that maximize the electromagnetic conversion characteristic (CNR) for a thin magnetic tape which is 50nm or less. See, for example, Figure 6 of Applicants disclosure which compares the much narrower critical range required of such a device compared to the thicker range disclosed in *Ishida*.

Neither reference cited, alone or in combination, teaches or suggests such a range in a thin film magnetic tape, or the criticality of such a range as shown in Figures 1A – 2B, in regard to the discontinuities created in the orientations of the dispersed magnetic particles.

Regarding the second claim element directed to the growth orientation of dispersed magnetic particles, Applicants submit that the prior art of record fails to teach or suggest anything regarding the actual growth orientation of the dispersed magnetic particles. Furthermore, Applicants submit that, counter to the Examiner's assertion; the growth direction of the dispersed crystals is not directly proportional to the incidence angle of deposition. For example, see the Comparative Examples 1 in Table 1 on page 26 of the disclosure, which shows that an initial incidence angle of 70° results in a growth orientation of 54°, and a final incidence angle of 40° results in a growth orientation of 27°. Significantly, when comparing this to Comparative Example 2 in Table 1, an increase in the initial incidence angle by 5° (to 75°) results in an increase of the growth orientation by 9° (to 63°). Furthermore, an increase in the final incidence angle by 5° (to 45°) results in an increase of the growth orientation by only 2° (to 29°). Accordingly, Applicants submit that the Examiner's prima facie assertion of anticipation cannot stand, as it is clear that the growth direction of the dispersed magnetic crystals is not directly proportional to the incidence angle.

For all the reasons set forth above, Applicants submit that the Examiner's rejection of claim 1 under 35 U.S.C. §102 must be withdrawn, and claim 1 placed into condition for allowance.

B. <u>The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 3.</u>

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 3 under 35 U.S.C. §102(b) and alternatively under §103(a). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Dependent claim 3 currently contains the following additional limitations over that of independent claim 1:

"further wherein the magnetic layer is less than the 50 nm in thickness."

Applicant notes that the main contention remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element regarding the thickness of the magnetic layer.

As noted in the previous section in regard to claim 1, *Ishida* fails to anticipate Applicant's claimed magnetic layer at a thickness of less than 50nm. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the Ishida reference, which states that the magnetic layer is should preferably be grown at a thickness of "from 50nm to 150 nm." From this statement, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that "When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger...But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer." In light of the use of the term "exceed," Applicants submit that one of ordinary skill in the art would interpret the stated range of

operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

Additionally, in regard to the Examiner's obviousness assertion, Applicants submit that the *Ishida* reference clearly teaches away from the further limitation of claim 3. For example, in Column 14, line 58, stating that the thickness of the magnetic layer is "preferably 50nm to 150nm." Furthermore, see Fig. 21 of Ishida, which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below. In light of Federal Circuit caselaw that states that "it is improper to combine references where the references teach away from their combination," Applicants submit that the rejection of claim 3 must be withdrawn, and claim 3 placed into condition for allowance. (See *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)).

C. **The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 2.**

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 2 under 35 U.S.C. §103(a). Examiner has rejected these claims in view of the cited prior art references of *Ishida et al.* (U.S. Patent No. 5,554,440) and *Tsunekawa et al.* (U.S. Patent No. 7,026,064).

Under Section 2143 of the MPEP, in order to establish a prima facie case of obviousness, the Examiner must meet three basic criteria. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art

reference (or references when combined) must teach or suggest all the claim limitations." *MPEP §2143 rev. 3* (August, 2005).

Applicant asserts that the Examiner has failed to establish a prima facie case of obviousness for at least the reason that the prior art reference fails to teach or suggest all of the claim limitations.

Claim 3 adds the further limitations of (corrected for clarity on appeal, corrections noted in parentheses):

> an underlying layer comprised of binder resins (residents) and having an average particle diameter of 5 to 30 nm and wherein the (he) density of surface projections is in a range of from 50 X 10^4 per millimeter squared to 3000 X 10^4 per millimeter squared.

In regard to at least the limitation regarding the density of surface projections, Applicants submit that the cited portion of the *Tsunekawa* reference does not support the Examiner's assertion of prior art anticipation. More specifically, the portion of the *Tsunekawa* reference to which the Examiner cites (Column 7, lines 3 – 21) merely discloses the density distribution of protrusions between 3nm and 5nm (See specifically, line 7). The reference fails to disclose the overall density for all protrusions, as currently claimed.

At least for the reasons cited above, Applicants submit that the cited references fail to teach or suggest all of the limitations of the claimed invention. As noted in earlier sections, the Ishida reference fails to teach or suggest the limitations of the base claim. In addition, Applicants submit that the Tsunekawa reference fails to teach or suggest the additional limitations set forth in the dependent claim 3. Accordingly, Applicant submits that claim 3 is

allowable over the cited prior art, and respectfully request that the rejection be over-turned on appeal and the remaining claim placed in condition for allowance.

CONCLUSION

In light of the foregoing, Applicant submits that the rejections of all claims are improper for the reasons noted and the rejections should all therefore be withdrawn.

Respectfully submitted,

Date: August 28, 2006

(Reg. #37,607)

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Attorneys for Applicant

CLAIMS APPENDIX:

This listing of claims reflects the current status of the claims as they stand in light of the May 26, 2006 Final Office Action:

1. (Rejected) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,

wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$\theta i - \theta f \leq 25°$

where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and

and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship:

$\alpha i - \alpha f \leq 25°$.

2. (Rejected) The magnetic recording medium according to claim 1, further including an underlying layer comprised of binder residents and having an average particle diameter of 5 to 30 nm and wherein he density of surface projections is in a range of from 50 X 10^4 per millimeter squared to 3000 X 10^4 per millimeter squared.

3. (Rejected) The magnetic recording medium according to claim 1, further wherein the magnetic layer is less than the 50 nm in thickness.

IX. EVIDENCE APPENDIX:

None.

X. RELATED PROCEEDINGS APPENDIX:

None.